Appendix S

S.1 South Dakota Field Office Air Resource Management Plan: *Adaptive Management Strategy for Oil and Gas Resources*

Table of Contents

List of Tables

Acronyms

APD	Application for Permits to Drill
AQRV	Air quality related value
AQS	Air Quality System
AQTW	Air Quality Technical Workgroup
ARMP	Air Resource Management Plan
ARTSD	Air Resource Technical Support Document
BLM	Bureau of Land Management
CAMx	Comprehensive Air Quality Model with Extensions
CFR	Code of Federal Regulations
CMAQ	EPA Models-3/Community Multiscale Air Quality
CO	Carbon monoxide
DOI	U.S. Department of Interior
EPA	U.S. Environmental Protection Agency
FLIR	Forward looking infrared
FS	U.S. Forest Service
FWS	U.S. Fish and Wildlife Service
hp	Horsepower
$\mu g/m^3$	Micrograms per cubic meter
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPS	National Park Service
O_3	Ozone
Pb	Lead
PGM	Photochemical grid modeling
PM_{10}	Particulate matter with a diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate matter with a diameter less than or equal to 2.5 microns
POD	Plan of Development
ppb	Parts per billion
ppm	Parts per million
REC	Reduced emissions completion
ROD	Record of Decision
RMP	Resource Management Plan
SDAAQS	South Dakota Ambient Air Quality Standards
SD DENR	South Dakota Department of Environment & Natural Resources
SLAMS	State or Local Air Monitoring Station
SO_2	Sulfur dioxide
VOC	Volatile organic compound
WRAP	Western Regional Air Partnership
WRF	Weather and Research Forecasting

1.0 Introduction

1.1 Purpose of the Air Management Plan

The Bureau of Land Management (BLM) South Dakota Field Office (SDFO) Air Resource Management Plan (ARMP) for oil and gas activities describes the air quality adaptive management strategy that would be used to assess future air quality and Air Quality Related Values (AQRVs) and identify mitigation measures to address unacceptable impacts that may be associated with future oil and gas development. The adaptive management strategy focuses on oil and gas activity because aggregated emissions from multiple small sources at well sites can potentially cause significant air quality and AQRV impacts under certain circumstances. Many of these small oil and gas emission sources are not required to obtain air quality permits from the South Dakota Department of Environment & Natural Resources (SD DENR), unlike large stationary sources such as coal mines that are permitted and inspected by the SD DENR. The oil and gas adaptive management strategy was prepared in collaboration with the U.S. Environmental Protection Agency (EPA) and three federal land management agencies under the *Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act [NEPA] Process* (DOI 2011). This agreement is described in more detail in Section 0.

The ARMP includes both near-term actions and long-term actions. In the near-term, the ARMP sets forth initial actions to maintain good air quality until regional modeling can be performed to further assess potential impacts to air quality and AQRVs. In the long-term, the ARMP provides ongoing management strategies to assess and adapt to new air quality and AQRV ambient monitoring and modeling data during the life of this Resource Management Plan (RMP).

The ARMP includes a multifaceted approach involving the following activities.

- Oil and gas activity assessment
- Ambient air quality monitoring support
- Air quality and AQRV assessment
- Future air quality and AQRV modeling
- Mitigation

Pollutant emissions addressed by the ARMP include the criteria air pollutants listed below.

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Particulate matter with a diameter less than or equal to 10 microns (PM_{10})
- Particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$)
- Sulfur dioxide (SO_2)

Two criteria air pollutants, CO and lead, are not monitored within the planning area because high concentrations of these pollutants are unlikely. Elevated concentrations of CO are associated with vehicle traffic in very large urban areas, while high concentrations of lead are typically found near industrial facilities that emit large quantities of sulfur compounds. These situations do not occur in the planning area, as described in Chapter 3 of the Draft RMP. CO and SO_2 emissions would be modeled to demonstrate compliance with the NAAQS. Due to the lack of lead emissions from oil and gas activities, lead emissions would not be modeled as part of the air quality analysis.

The ARMP also addresses modeling and mitigation for the following AQRV assessments.

- Deposition of sulfur and nitrogen
- Lake acid neutralizing capacity
- Visibility

The adaptive management strategy for oil and gas resources provides the flexibility to respond to changing conditions that could not have been predicted during RMP development, as well as allow for the use of new technology and methods that may minimize or reduce impacts.

1.2 Revision of the Air Resource Management Plan

This ARMP may be modified as necessary to comply with law, regulation, and policy and to address new information and changing circumstances. Changes to the goals or objectives set forth in the SDFO RMP/EIS would require maintenance or amendment of the RMP while changes to implementation, including modifying this ARMP, may be made without amending the RMP.

1.3 Current Air Quality

Areas within the planning area are designated as areas that attain the National Ambient Air Quality Standards (NAAQS) and state-based standards known as the South Dakota Ambient Air Quality Standards (SDAAQS), which are identical to the NAAQS. Throughout this document references to the NAAQS will also be understood to include the SDAAQS.

1.4 Background of the AQTW and the MOU Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions through the NEPA Process

The Air Quality Technical Workgroup (AQTW) includes representatives from the following agencies: the BLM, EPA, U.S. Forest Service (FS), U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS). Each of these agencies is a party to the *Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process* (DOI 2011) (herein referred to as the MOU). This agreement is designed to ". . . facilitate the completion of NEPA environmental analyses for Federal land use planning and oil and gas development decisions [DOI 2011]."

The Memorandum of Agreement (MOU) sets forth collaborative procedures that the AQTW agencies use to analyze potential air quality and AQRV impacts. The agencies also work together to identify potential mitigation measures that may be needed to reduce impacts to air quality and AQRVs. The lead agency (the BLM in this case), in collaboration with the other agencies, has the responsibility to identify reasonable mitigation and control measures and design features to address adverse impacts to air quality. Mitigation measures may also address impacts to AQRVs at Class I areas and at sensitive Class II areas that have been identified by the BLM, FS, FWS, and NPS.

The AQTW provided input to this ARMP and will continue to work collaboratively on future modeling efforts associated with this RMP. Provisions of the MOU continue to apply to future oil and gas activities in the planning area. In some cases, air quality and AQRV modeling performed under this ARMP may be sufficient to address modeling needs for future oil and gas projects that would otherwise require additional modeling under the MOU. However, the ARMP in no way replaces provisions of the MOU. Determinations of existing modeling adequacy for future oil and gas activities that trigger the MOU would be made collaboratively by the AQTW using the procedures included in the MOU.

The SD DENR has the primary authority to protect air quality within the state. Although the SD DENR is not a signatory to the national MOU, successful air quality management of BLM-authorized oil and gas activities depends on a close working relationship between the BLM and the SD DENR. The two agencies have worked together to improve air quality monitoring and will continue to cooperate by sharing data, planning modeling efforts, and working together to identify emission reduction measures needed to maintain good air quality.

2.0 Oil and Gas Activity Assessment

Each year, the BLM would track the number and locations of new oil and gas wells drilled on federal mineral estate and the number of new and abandoned producing wells on federal mineral estate. These numbers would be compared to the planning area RFD and to the level of oil and gas development identified in the preferred alternative.

In addition, the BLM would estimate oil and gas emissions from federal mineral estate every three years for oil and gas wells drilled and producing after the ROD is signed. Emission estimates would be based on well types, well numbers, and knowledge of typical equipment and operations. Emission estimation methods are expected to improve over time as better data become available. The emission estimates would also account for implemented mitigation measures and for new emission control regulations as they become effective. The BLM would collect additional data related to oil and gas equipment and operations to improve emission inventory quality. One area identified for improvement involves acquiring better data on oil and gas equipment used in the planning area. In order to improve fugitive dust emission estimates, the number, type, and length of vehicle trips in high-activity areas would also be assessed.

Each three-year oil and gas emission inventory would be compared to emission estimates for the RFD and the preferred alternative.

3.0 Ambient Air Quality Monitoring Support

The Air Quality Program of the SD DENR has primary responsibility for siting and operating ambient air quality monitors within South Dakota and for reporting monitoring data to EPA and to the public. As described in its annual Ambient Air Monitoring Annual Network Plan (SD DENR 2012), the SD DENR identifies monitoring objectives for assessing ambient concentrations of criteria air pollutants and assessing compliance with the NAAQS.

Monitors that are located within the planning area and are representative of rural areas near oil and gas activity are listed in Table 1. These monitors would be used by the BLM when developing annual air quality assessments. If additional SD DENR monitoring stations are installed and operated for the purpose of assessing air quality impacts from oil and gas activity, data from these monitors would be used for ambient air quality assessments under this plan.

Table 1. Representative Air Quality Monitoring Stations Within the Planning Area

Station Name	*Pollutants Monitored by SLAMS*	*Station Number*	*County*	*Latitude*	*Longitude*
Badlands	NO_2, O_3, PM_{10}, $PM_{2.5}$, SO_2	46-071-0001	Jackson	N 4,847,799.95	E 263,173.81
Wind Cave	O_3, PM_{10}, $PM_{2.5}$	46-033-0132	Custer	N 4,823,856.93	E 622,471.56

Latitude and longitude are provided in UTM coordinates based on Zone 13, NAD 83.

4.0 Air Quality and AQRV Assessment

The BLM would assess air quality and AQRVs on an annual basis using quality-assured data from the EPA, SD DENR, FS, FWS, NPS, and other sources. In addition, a preliminary assessment of ozone concentrations would be performed on a weekly basis using data provided by the SD DENR.

4.1 Annual NAAQS Assessment

Based on the monitors listed in Section 0, the BLM would assess air quality monitoring data annually and would share the results of the assessment with the SD DENR and AQTW. The purposes of the annual assessment are to compare monitored data to NAAQS and to identify seasonal and long-term trends in air pollutant concentrations. The BLM would complete the annual assessment by May 31 of each year in order to ensure that quality-assured data are available for review.

NAAQS are provided in Table 2 for pollutants monitored within the planning area. As of December 1, 2012, CO and lead were not monitored within the planning area.

Table 2. NAAQS for Pollutants Monitored in the Planning Area

Pollutant	*Averaging Period*	*Concentration*	*Standard Type*	*Form of NAAQS[1] Primary Standard*
NO_2	1-hour	100 ppb	Primary	3-year average of the 98th percentile concentrations
	Annual	53 ppb	Primary, Secondary	Annual mean
Ozone	8-hour	0.075 ppm	Primary, Secondary	3-year average of the fourth highest daily maximum 8-hour average
$PM_{2.5}$	24-hour	35 µg/m^3	Primary, Secondary [3]	3-year average of the 98th percentile concentrations
	Annual	12.0 µg/m^3 [2] 15.0 µg/m^3	Primary, Secondary	3-year average annual mean
PM_{10}	24-hour	150 µg/m^3	Primary, Secondary	NTBE more than one per year on average over 3 years
SO_2	1-hour	75 ppb	Primary	3-year average of the 99th percentile concentrations
	3-hour	0.5 ppm	Secondary	Annual 2nd highest maximum of 3-hour block averages

µg/m^3 micrograms per cubic meter Standards
NAAQS National Ambient Air Quality Standards
NO_2 nitrogen dioxide
NTBE not to be exceeded
$PM_{2.5}$ particulate matter less than or equal to 2.5 microns
PM_{10} particulate matter less than or equal to 10 microns
ppb parts per billion
ppm parts per million
SO_2 sulfur dioxide

[1] NAAQS are codified in Title 40 of the Code of Federal Regulations (CFR), Part 50.
[2] Effective March 18, 2013, the primary annual $PM_{2.5}$ standard was revised from 15.0 µg/m^3 to 12.0 µg/m^3.
[3] The secondary annual $PM_{2.5}$ standard remains at 15.0 µg/m^3.

The BLM would use design values to compare ambient monitoring data to the NAAQS. Design values reflect the form of the NAAQS; they define the statistical metric used to compare monitoring data to federal and state standards. Depending on the pollutant and averaging time being assessed, the NAAQS is typically stated in terms of the maximum or second maximum concentration, average concentration, or a percentile of the standard. The form of a standard also states whether the design value is determined based on one or more years of monitoring data. EPA-calculated design values serve a critically important regulatory purpose; they determine whether areas are designated attainment or nonattainment. As such, EPA's design value determinations may take more than one year to finalize.

In order to review air quality trends more quickly, the BLM would calculate "mitigation design values" by May 31 of each year for the previous calendar year(s). The mitigation design value would be a metric calculated by the BLM that uses procedures similar to EPA's regulatory design value calculation methodology, with the advantage that the BLM-calculated values can be determined more quickly. The timing allows the SD DENR adequate time to quality assure monitoring data. However, the SD DENR may not yet have EPA concurrence on data that has been flagged by the SD DENR due to exceptional events, such as wildfires. Consequently, the BLM-calculated mitigation design values would exclude monitoring data associated with SD DENR-identified exceptional events. Each BLM annual assessment would look back the requisite number of years for each pollutant and include data from the time period prior to ROD issuance for the first several annual BLM assessments. Additional information concerning design value calculations is provided in Section 0.

4.2 Preliminary Ozone Assessment

BLM would perform weekly preliminary ozone concentration reviews to determine if high ozone events occur at the monitors identified in Section 0. If a high-ozone event occurs, the BLM would document meteorological and other conditions that may have contributed to the event. Because high-ozone events in other rural parts of the nation are not

well understood and contributing factors can be site-specific, the BLM would gather data to develop baseline information relevant to any high-ozone events that may occur within the planning area. Relevant baseline information includes capturing meteorological data for each event, determining the amount of snow on the ground (if applicable), and identifying any other data that may help describe circumstances associated with the event. For the purposes of this effort, a high-ozone event would be defined as a day for which the maximum 8-hour average ozone concentration is at or above 0.065 ppm.

In order to quickly ascertain relevant circumstances, the preliminary ozone assessments would use non-quality-assured data provided by the SD DENR. As part of the annual NAAQS assessment, quality-assured ozone data would be reviewed to determine if the preliminary ozone monitoring data were valid or if monitored high ozone concentrations were due to monitor malfunctions.

If high-ozone events occur within the planning area, a summary of events and a discussion of relevant meteorological data and circumstances would be developed as part of the annual NAAQS assessment. These summaries and the underlying data may provide important information that can be used to predict potential occurrences of high-ozone events and to identify mitigation measures and/or proactive measures that could prevent future events.

4.3 Annual AQRV Assessment

Federal land managers track the status, condition, and trends of AQRVs for Class I and sensitive Class II areas under their jurisdictions. Consequently, the BLM would request visibility, sulfur and nitrogen deposition, and lake acid neutralizing capacity data from the FS, FWS, and NPS and would include agency-submitted data in the BLM's annual review of AQRV trends. The annual review would also include AQRV data from any Class I or sensitive Class II areas under BLM jurisdiction.

Based on these reviews, the BLM would maintain an awareness of AQRV trends. However, it should be noted that the reviews would not necessarily link AQRV trends to oil and gas development within the planning area. AQRV impacts are often associated with pollutants that can be transported long distances from many different types of sources. For example, sources outside South Dakota play a major role in visibility degradation at Wind Cave National Park and at Badlands National Park, as described in the South Dakota's Regional Haze State Implementation Plan (SD DENR 2011).

5.0 Future Modeling

The BLM has committed to perform PGM in order to assess regional air quality and AQRV impacts. Due to insufficient monitoring and regional emissions data available during development of the RMP, PGM would not be completed prior to issuance of the RMP/EIS and the ROD. In order to complete PGM expeditiously, the BLM has begun data acquisition and initiated steps needed to proceed with PGM. When PGM is completed and the results assessed, the BLM may identify additional emission mitigation measures for oil and gas activity.

5.1 Photochemical Grid Modeling

Comprehensive regional air quality and AQRV regional modeling of emission sources within the planning area and surrounding areas requires PGM. This type of modeling can predict ozone and regional haze impacts, for which major pollutants and precursors can be transported many hundreds of miles.

5.1.1 Data Acquisition

PGM requires three main types of concurrent data: meteorological data, ambient monitoring data, and comprehensive emission data. BLM's analysis determined that the latter two types of data need to be augmented and updated prior to performing PGM.

Additional Monitoring

Ambient monitoring data throughout the PGM domain is needed in order to validate model performance, which is assessed by modeling a previous year and comparing the model's predicted concentrations to actual monitored concentrations. New monitors in northern and central Montana near the towns of Malta and Lewistown will provide much-needed data to assess model performance in areas with oil and gas activity northwest of the planning area.

Updating Emission Inventories

Comprehensive emission inventories are also critically important in predicting cumulative air quality and AQRV impacts. Current oil and gas regional emission inventories for South Dakota are known to lack important emission sources, particularly sources of volatile organic compounds (VOCs), which contribute to ozone formation. The existing regional oil and gas inventory for the Williston Basin represents the year 2002 and was developed as part of the Western Regional Air Partnership (WRAP) Phase II inventory. Since then, 2006 Phase III emission inventories have been developed for oil and gas basins within Colorado, Utah, Wyoming, and New Mexico, but have not yet been completed for Montana, North Dakota, and South Dakota. The Phase III inventories have more comprehensive emission inventories of VOC sources at oil and gas facilities.

The BLM Montana and Dakotas State Office is providing financial assistance to the WRAP so that Phase III oil and gas emission inventories can be completed in 2013 for the Williston Basin and the Central Montana Basin. These inventories would represent calendar year 2011 emissions. In addition to covering the planning area, the inventories would include comprehensive recent emission estimates for oil and gas activity in North Dakota and Montana.

5.1.2 PGM Schedule

In order to use a full 12 months of ambient monitoring data from the new monitors in northern and central Montana, the baseline year for PGM is expected to be 2013 or may be a 12-month period beginning in late 2012 and ending in 2013. PGM planning began in 2012 and development of the PGM modeling protocol is expected to be completed during 2013, with modeling occurring primarily in 2014 and early 2015. Review and assessment of PGM results would be completed in June 2015. Table 3 provides the data acquisition and PGM schedule.

The Weather Research and Forecasting (WRF) model would be used to model meteorological conditions and the photochemical grid model to be used would be either the EPA Models-3/Community Multiscale Air Quality (CMAQ) modeling system or the Comprehensive Air Quality Model with Extensions (CAMx). In addition, multiple models would be used to develop and process emission inventories for input into the photochemical grid model. When modeling is completed, an Air Resource Technical Support Document (ARTSD) would be developed.

Initial PGM would include future year modeling for a year between 2017 and 2020. The specific year would be determined by the BLM based on the ability to predict future regional oil and gas emissions in the Williston and Central Montana Basins. After initial PGM is completed, the BLM would begin an assessment process to determine when additional PGM updates are needed. Factors to be considered in determining when additional PGM is needed include: 1) the adequacy of the adaptive management strategy to maintain good air quality, and 2) the level of BLM-authorized oil and gas activity and emissions compared to modeled levels.

Table 3. Data Acquisition and PGM Schedule

Task / Subtask	*Duration (calendar days)*	*Start Date*	*End Date*
Pre-Modeling Emission Inventory Development			
Emission Inventory Contracting	56	7/16/2012	8/27/2012
"WRAP" Williston and Central Montana Basin Inventory	270	11/1/2012	7/29/2013
Contracting for WRF Model and PGM Protocol			
WRF Model and PGM Protocol RFP	56	7/16/2012	9/10/2012
Select PGM Modeling Protocol Contractor	14	9/11/2012	9/25/2012

Table 3. Data Acquisition and PGM Schedule			
Task / Subtask	***Duration (calendar days)***	***Start Date***	***End Date***
PGM Protocol			
Develop Initial Draft WRF and PGM Protocol	102	10/1/2012	1/10/2013
AQTW and SD DENR Protocol Review	26	1/11/20132	2/6/2013
Finalize Protocol	54	2/7/2013	4/2/2013
Contracting for WRF and PGM Modeling			
WRF and PGM RFP	30	4/2/2013	5/2/2013
Select WRF and PGM Contractor	21	5/3/2013	5/24/2013
Base Year (calendar year 2013) Modeling and Evaluation			
WRF Modeling	120	10/23/2013	2/20/2014
Draft WRF Model Evaluation	30	2/20/2014	3/22/2014
AQTW and SD DENR WRF Evaluation Review	30	3/22/2014	4/21/2014
Emission Modeling (Base and Future Year) & Report	120	10/23/2013	2/20/2014
Photochemical Grid Modeling	150	2/20/2014	7/20/2014
Draft PGM Evaluation	30	7/20/2014	8/19/2014
AQTW and SD DENR PGM Evaluation Review	30	8/19/2014	9/18/2014
Finalize WRF and PGM Evaluations	21	9/18/2014	10/9/2014
Future Year Modeling and Evaluation			
Photochemical Grid Modeling	150	10/9/2014	3/8/2015
Analyze Air Quality and AQRV Impacts	21	3/8/2015	3/29/2015
Draft ARTSD	21	3/29/2015	4/19/2015
AQTW ARTSD Review	30	4/19/2015	5/19/2015
Finalize ARTSD	21	5/19/2015	6/9/2015

AQTW = Air Quality Technical Workgroup
ARTSD = Air Resource Technical Support Document
SD DENR = South Dakota Department of Environment & Natural Resources
PGM = Photochemical grid modeling
RFP = Request for Proposal
WRF = Weather Research and Forecasting Model
WRAP = Western Regional Air Partnership

5.1.3 SD DENR and AQTW Review and Input to PGM

Throughout the PGM data collection and modeling process, the BLM would work collaboratively with the SD DENR and the AQTW that was formed to provide input on this ARMP, and with and other agencies or Tribes that request to be involved in the PGM effort. These collaborators would provide technical review and comment on the draft modeling protocol, on WRF and PGM performance evaluations, and on the draft ARTSD. Substantial time has been included in the schedule shown in Table 3 to allow adequate review and comment periods during the PGM process.

5.1.4 Availability of PGM Results

Future PGM results would be presented in the final ARTSD and in a summary of the results. The ARTSD and summary document would be posted on the SDFO website. In addition, the WRF and PGM protocol document would be provided

via the website when the photochemical modeling ARTSD is made available. Outreach information regarding the availability of the results would be made through the AQTW and agencies involved in the PGM process, as well as other interested parties.

5.2 Post-PGM Modeling

To the extent that future emission increases are within the levels modeled with PGM or other modeling and are proximate to modeled emission locations, far-field air quality and AQRV impact analysis may incorporate by reference PGM and other modeling results. The BLM and the AQTW would determine whether previous modeling is sufficient to satisfy MOU requirements. This air quality management approach is consistent with the Air Quality Oil and Gas MOU (DOI 2011) and allows for efficient air quality and AQRV impact analysis.

If additional modeling is performed after PGM is complete, an assessment of air quality and AQRV impacts would be made and, if necessary, additional mitigation measures may be identified.

6.0 Mitigation

Air quality and AQRV impact mitigation would involve two types of mitigation: 1) initial mitigation measures that become effective when the ROD is signed, and 2) enhanced mitigation measures that may be identified based on future ambient monitoring data or modeling results.

6.1 Initial Mitigation Actions

The following air quality mitigation measures would be applied upon issuance of the ROD through leasing documents and project-specific NEPA documents. To the extent practical, emission reductions associated with these mitigation measures have been included in the RMP/EIS emission inventory.

1. Design and construct roads and well pads to reduce the amount of fugitive dust generated by traffic or other activities. During construction activities, apply water, apply dust-suppression chemicals, apply gravel, or use other control methods to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen.
2. Use water or other BLM-approved dust suppression during drilling, completion, and well workover operations for dust abatement on access roads, as needed, to achieve a 50 percent fugitive dust control efficiency, except when ground is wet or frozen.
3. Use water or other BLM-approved dust suppression in high traffic areas during production operations for dust abatement, as needed, to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen. Operators will work with local government agencies to improve dust suppression on roads.
4. For oil and gas Project Plans of Development (PODs), oil and gas operators will establish speed limits for project-required unpaved roads in and adjacent to the project area; oil and gas operator employees will comply with these speed limits.
5. For oil and gas Project PODs, oil and gas operators will be encouraged to reduce surface disturbance, vehicle traffic, and fugitive dust emissions by consolidating facilities (e.g., using multi-well pads, storage vessels) when feasible.
6. Diesel drill rig engines greater than 200 hp will meet Tier 4 emission standards for non-road diesel engines. Alternatively, oil and gas operators may use drill rig engines that exceed Tier 4 emission standards if modeling demonstrates compliance with the NAAQS and protection of AQRVs.
7. For hydraulically fractured gas wells that do not qualify as “low pressure wells”, “wildcat,” or “delineation” wells, oil and gas operators will comply with reduced emissions completion (REC) requirements specified in Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution (40 CFR §60.5375) within six months of ROD issuance.

8. Non-road diesel engines will be required to use ultra-low sulfur diesel fuel (15 ppmw) as required by 40 CFR §80.610(e)(3)(iii).

6.2 Monitoring-Based Mitigation

Enhanced mitigation would be evaluated and implemented if ambient monitoring data at monitors located in oil and gas activity areas within the planning area indicate that pollutant concentrations are approaching or threatening the NAAQS. If additional SD DENR monitoring stations are placed in oil and gas activity areas for the purpose of assessing air quality impacts from oil and gas activity, data from these stations would be included in ambient air quality assessments used to determine whether enhanced mitigation is needed.

Prior to completion of initial PGM, monitoring-based thresholds would be based on evaluation of exceedances of the NAAQS, as described in Section 0. After completion of initial PGM, monitoring-based thresholds would be based on BLM-calculated design values, as described in Section 0.

6.2.1 Monitoring-Based Thresholds before PGM Completion

Based on requests from EPA during the MOU review process, the BLM would review NAAQS exceedances and determine if enhanced mitigation would be warranted during the interim period between ROD issuance and PGM completion. The BLM would require enhanced mitigation for BLM-authorized oil and gas activities if there is a monitored exceedance of the NAAQS at a monitor listed in Section 0, unless the BLM determines that enhanced mitigation is not warranted after completing specified steps as outlined below.

1. The BLM would notify the EPA and SD DENR within 30 days after monitoring data showing an exceedance has been posted on EPA's Air Quality System (AQS). The notification would state that the BLM is reviewing the exceedance according to this procedure.

2. After consulting with the SD DENR, the BLM would determine whether an exceptional event[1] may have caused the exceedance.

    - If the SD DENR informs the BLM that an exceptional event likely caused the exceedance, the BLM would provide a letter to that effect to the EPA. No further action would be necessary.
    - If an exceptional event did not cause the exceedance or if SD DENR would not submit an exceptional event waiver to EPA, the BLM would perform Step 3.

3. The BLM would conduct a screening level analysis[2] to determine the likely source and location of the exceedance and whether mitigation is needed.[3]

    - If the screening analysis indicates that the exceedance was not caused by BLM-authorized oil and gas source(s) within the planning area or indicates that the BLM-authorized oil and gas source(s) within

[1] The BLM would not formally decide that an exceptional event occurred as this decision would be made by the SD DENR. Until a final determination of an exceptional event is presented to EPA by the SD DENR, and the EPA has concurred, the BLM would assume that an exceptional event occurred based on a stated intention by the SD DENR to submit an exceptional event waiver.

[2] Publically available web based applications suggested by the EPA to identify sources of air pollution and potential impacts include the following sites: trajectory analysis tools like HySplit (http://ready.arl.noaa.gov/), air quality data at the EPA's AQS site (http://airnow.gov), state regulatory agency sites and airnowtech.org, an interactive snow site (http://www.nohrsc.nws.gov/interactive/html/map.html), daily ozone modeling (http://airquality.weather.gov/), daily ozone and $PM_{2.5}$ modeling site (http://www.getbluesky.org/), and daily satellite imagery site (http://ge.ssec.wisc.edu/modis-today/).

[3] If data necessary to conduct a screening level analysis is not available, the BLM would consult with the SD DENR and the EPA regarding source attribution and the need for mitigation.

the planning did not contribute to the exceedance, the BLM would convey this finding in writing to the SD DENR and EPA for review and comment. No further action would be necessary.

- If the screening analysis indicates that the exceedance was caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would perform Step 4.

4. The BLM would consult with the SD DENR and EPA to determine whether there is a need for: 1) a refined attribution analysis (e.g., attribution test using CAMx ozone source attribution technology or anthropogenic precursor's culpability assessment) or 2) mitigation on BLM-authorized oil and gas emission sources within the planning area. If the refined analysis:

   - Is warranted, BLM would perform the refined analysis within 6 months of completing Step 3 in consultation with SD DENR and EPA.
   - Indicates that the exceedance was not caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would provide that recommendation to the SD DENR and EPA for review and comment. No further action would be necessary.
   - Indicates that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, the BLM would evaluate enhanced mitigation measures, as described in Section 0.

6.2.2 Determination of Enhanced Mitigation Measures before PGM Completion

If a NAAQS exceedance occurs prior to completion of PGM and the refined analysis in Step 4 above determined that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, enhanced mitigation measures would be evaluated and selected by the BLM, in cooperation with the SD DENR and the AQTW, when appropriate. Preference would be given to mitigation methods that the SD DENR intends to impose as new regulations or air quality permitting provisions. Selected mitigation measures would be implemented within one year after the BLM decision to apply additional mitigation.

Potential enhanced mitigation measures include the measures listed below based on current information concerning potential emission reduction technologies. Additional measures or equivalent methods or emission restrictions may be identified in the future.

- Drilling and/or blowdown activity restrictions based on meteorological conditions
- Construction activity restrictions based on meteorological conditions
- Centralization of gathering facilities
- Electric drill rigs
- Field electrification for compressors and/or pumpjack engines
- Plunger lift systems with smart automation
- Oil tank load out vapor recovery
- VOC controls on tanks with a potential to emit less than 5 tons per year
- Selective catalytic reduction on non-drill rig stationary engines
- Reduced emission completions beyond those required by EPA regulations, if determined to be technically and economically feasible
- Well pad density limitations
- Reducing the total number of drill rigs operating simultaneously
- Seasonally reducing or ceasing drilling during specified periods
- Using only lower-emitting drill and completion rig engines during specified time periods
- Using natural gas-fired drill and completion rig engines
- Replacing internal combustion engines with gas turbines for natural gas compression
- Employing a monthly forward looking infrared (FLIR) leak detection program to reduce VOCs
- Tank load out vapor recovery
- Enhanced VOC emission controls with 95% control efficiency on additional production equipment having a potential to emit of greater than 5 tons/year
- Enhanced direct inspection and maintenance program

6.2.3 Monitoring-Based Thresholds After PGM Completion

By May 31 of each year following completion of PGM, the BLM would calculate design values for each pollutant monitored at a federal reference monitor within the planning area and identified as a representative monitor in Section 0. The design value would be calculated based on calendar year monitoring data available at the time. Monitoring data from the appropriate prior period would be used. For example, based on PGM completion in summer 2015, the first annual design value calculation would be performed by May 31, 2016 and would include monitoring data for calendar years 2013, 2014, and 2015 for three-year design values and on monitoring data for calendar year 2015 for single-year design values.

Calculation methods would, to the extent possible, follow EPA procedures provided in the following appendices within Title 40 of the Code of Federal Regulations (CFR), Part 50 in effect as of December 1, 2012. These procedures may be updated by future EPA regulations and this section of the ARMP would be revised to reflect changing regulations.

- NO_2 (Appendix S)
- O_3 (Appendix P)
- PM_{10} (Appendix K)
- $PM_{2.5}$ (Appendix N)
- SO_2 (Appendix T)

Design values would be calculated on a site-specific basis (i.e., no spatial averaging of multiple monitors). BLM design value calculations would exclude data associated with exceptional events identified by SD DENR.

6.2.4 Determination of Enhanced Mitigation Measures After PGM Completion

If the air quality assessment described in Section 0 indicates that a BLM-calculated design value is greater than 85 percent of a NAAQS, enhanced mitigation measures addressing that pollutant or pollutant precursor would be evaluated and selected by the BLM, in cooperation with the SD DENR and EPA, when appropriate. Potential enhanced mitigation measures include the measures listed above in Section 0, as well as additional measures that may be identified in the future.

6.3 Modeling-Based Mitigation

6.3.1 Modeling-Based Thresholds

Future modeling would assess air quality and AQRV impacts from future BLM-authorized oil and gas activity and would include regional PGM and project-specific modeling. Modeling-based thresholds for evaluating enhanced mitigation would include potential future impacts on NAAQS or impacts above specific levels of concern for AQRVs in Class I or sensitive Class II areas (as identified on a case-by-case basis by SD DENR or a federal land management or tribal agency).

6.3.2 Modeling-Based Enhanced Mitigation Measures

If BLM-authorized oil and gas activity is predicted to cause or contribute to impacts above the thresholds described above, the BLM would facilitate an interagency process to ensure that a comprehensive strategy is developed to manage air quality impacts from future oil and gas development within the region. The local, state, federal, and Tribal agencies involved in the regulation of air quality and the authorization of oil and gas development would evaluate modeling results from future modeling studies and identify potential air quality concerns and necessary reductions in air emissions. If the modeling predicts significant impacts, these agencies would use their respective authorities to implement enhanced emission control strategies, operating limitations, equipment standards, and/or pacing of development as necessary to ensure continued compliance with applicable ambient air quality standards, including the enhanced mitigation measures listed in Section 0, other future mitigation measures identified through BLM's adaptive management strategy, or reasonable mitigation measures suggested by the SD DENR or AQTW. If necessary, implementation of mitigation measures would occur within one year of obtaining final modeling results for mitigation measures that conform to currently implemented land use planning decisions and constraints.

Bibliography

DOI 2011. Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process. June 23, 2011. http://www.epa.gov/oecaerth/resources/policies/nepa/air-quality-analyses-mou-2011.pdf

SD DENR 2011. South Dakota's Regional Haze State Implementation Plan. August 18. http://denr.sd.gov/des/aq/aqnews/RegionalHaze.aspx

SD DENR 2012. South Dakota Ambient Air Monitoring Annual Network Plan. South Dakota Department of Environment & Natural Resources, Air Quality Program. http://denr.sd.gov/des/aq/aqnews/Ann%20plan%202012%20Final.pdf

S.2 South Dakota Field Office Emission Summaries for Alternatives A, B, C, and D

Future year emission estimate summaries, by alternative, for the South Dakota Field Office are shown on the following pages.

Alternative A
SDFO Future Year Emission Estimate Summary

	Emissions (tpy)										
Ownership	**CO**	**NO_x**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_{2ea}**
Federal / BLM											
Oil and Gas Development and Production											
Oil	83	36	286	1	16	3	18	8,039	46	0	9,029
Natural Gas	17	6	10	0	3	1	2	2,068	19	0	2,459
CBNG	2	1	1	0	1	0	0	178	5	0	286
Bentonite Mining	66	0	0	0	71	11	0	157	0	0	157
BLM Travel	1	0	0	0	9	1	0	42	0	0	44
BLM Road Maintenance	0	0	0	0	0	0	0	1	0	0	1
Fire Management [1]	198	6	11	1	59	21	4	75	10	1	744
Forestry Management	2	3	0	0	3	1	0	347	0	0	349
Livestock Grazing	0	0	0	0	8	1	0	18	322	0	6,788
Vegetation Management	0	0	0	0	1	0	0	2	0	0	2
Federal Emission Total	***369***	***52***	***308***	***2***	***171***	***39***	***25***	***10,925***	***403***	***2***	***19,859***
Non-Federal											
Oil and Gas Development and Production											
Oil	295	247	1,147	2	62	17	73	29,355	183	0	33,230
Natural Gas	50	34	38	0	9	2	10	4,983	67	0	6,378
CBNG	34	22	12	2	7	2	2	2,783	53	0	3,904
Non-Federal Emission Total	***379***	***303***	***1,196***	***4***	***77***	***21***	***84***	***37,121***	***303***	***0***	***43,512***

tpy = short tons per year

[1] *Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.*

Comparison to Current Total County Emissions

Emissions	*Emissions (tpy)*					
	CO	*NO_x*	*VOC*	*SO_2*	*PM_{10}*	*$PM_{2.5}$*
2008 NEI Emissions	*46,173*	*8,485*	*9,035*	*132*	*15,327*	*2,319*
Alt. A O&G (%) of NEI Emissions	*0.2%*	*0.5%*	*3.3%*	*0.1%*	*0.1%*	*0.2%*
Alt. A (%) of NEI Emissions	*0.8%*	*0.6%*	*3.4%*	*1.3%*	*1.1%*	*1.7%*

County Emissions (Butte, Custer, Fall River, Haakon, Harding, Lawrence, Meade, Pennington, Perkins, and Stanley counties).

Source: EPA 2008 National Emission Inventory (NEI), http://neibrowser.epa.gov/eis-public-web/geo/county-emissions.html?stateJurisdictionId=43&inventoryYear=2008, accessed December 12, 2011.

Alternative B
SDFO Future Year Emission Estimate Summary

Ownership	Emissions (tpy)										
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAPs	CO_2	CH_4	N_2O	CO_{2ea}
Federal / BLM											
Oil and Gas Development and Production											
Oil	67	29	230	0	13	3	15	6,446	37	0	7,240
Natural Gas	15	5	8	0	3	1	2	1,873	16	0	2,204
CBNG	2	1	1	0	1	0	0	178	5	0	286
Bentonite Mining	66	0	0	0	71	11	0	157	0	0	157
BLM Travel	1	0	0	0	9	1	0	42	0	0	44
BLM Road Maintenance	0	0	0	0	0	0	0	1	0	0	1
Fire Management [1]	905	25	47	7	130	82	8	75	48	7	3,215
Forestry Management	2	3	0	0	3	1	0	347	0	0	349
Livestock Grazing	0	0	0	0	9	1	0	18	340	0	7,148
Vegetation Management	0	0	0	0	1	0	0	2	0	0	2
Federal Emission Total	**1,058**	**64**	**286**	**7**	**240**	**99**	**24**	**9,138**	**445**	**7**	**20,646**
Non-Federal											
Oil and Gas Development and Production											
Oil	295	247	1,147	2	62	17	73	29,355	183	0	33,228
Natural Gas	50	34	38	0	9	2	10	4,984	67	0	6,378
CBNG	34	22	12	2	7	2	2	2,783	53	0	3,904
Non-Federal Emission Total	**379**	**303**	**1,196**	**4**	**77**	**21**	**84**	**37,122**	**303**	**0**	**43,510**

tpy = short tons per year

[1] *Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.*

Comparison to Current Total County Emissions

	Emissions (tpy)					
Emissions	**CO**	**NO_x**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
2008 NEI Emissions	*46,173*	*8,485*	*9,035*	*132*	*15,327*	*2,319*
Alt. B O&G (%) of NEI Emissions	*0.2%*	*0.4%*	*2.6%*	*0.1%*	*0.1%*	*0.1%*
Alt. B (%) of NEI Emissions	*2.3%*	*0.8%*	*3.2%*	*5.4%*	*1.6%*	*4.3%*

County Emissions (Butte, Custer, Fall River, Haakon, Harding, Lawrence, Meade, Pennington, Perkins, and Stanley counties).

Source: EPA 2008 National Emission Inventory (NEI), http://neibrowser.epa.gov/eis-public-web/geo/county-emissions.html?stateJurisdictionId=43&inventoryYear=2008, accessed December 12, 2011.

Comparison to Other Alternatives

	Emissions (tpy)										
Emissions	**CO**	**NO_x**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_{2ea}**
Alt. B - Alt. A	*689*	*12*	*(22)*	*5*	*68*	*60*	*(0)*	*(1,787)*	*43*	*5*	*787*
Alt B % Increase Over Alt A	*186.9%*	*22.0%*	*(7.2%)*	*317.5%*	*40.0%*	*156.7%*	*(1.8%)*	*(16.4%)*	*10.6%*	*347.3%*	*4.0%*

Alternative C
SDFO Future Year Emission Estimate Summary

Ownership	Emissions (tpy)										
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAPs	CO_2	CH_4	N_2O	CO_{2ea}
Federal / BLM											
Oil and Gas Development and Production											
Oil	37	16	129	0	7	1	8	3,481	21	0	3,924
Natural Gas	8	3	4	0	1	0	1	995	9	0	1,179
CBNG	2	1	1	0	1	0	0	178	5	0	286
Bentonite Mining	66	0	0	0	71	11	0	157	0	0	157
BLM Travel	1	0	0	0	9	1	0	42	0	0	44
BLM Road Maintenance	0	0	0	0	0	0	0	1	0	0	1
Fire Management [1]	456	13	24	3	85	43	5	75	24	3	1,645
Forestry Management	2	3	0	0	3	1	0	347	0	0	349
Livestock Grazing	0	0	0	0	8	1	0	18	322	0	6,788
Vegetation Management	0	0	0	0	1	0	0	2	0	0	2
Federal Emission Total	**571**	**36**	**159**	**4**	**186**	**59**	**15**	**5,295**	**381**	**3**	**14,375**
Non-Federal											
Oil and Gas Development and Production											
Oil	295	247	1,147	2	62	17	73	29,355	183	0	33,224
Natural Gas	50	38	38	0	9	2	10	4,984	67	0	6,377
CBNG	34	22	12	2	7	2	2	2,783	53	0	3,904
Non-Federal Emission Total	**379**	**307**	**1,196**	**4**	**77**	**21**	**84**	**37,122**	**303**	**0**	**43,505**

tpy = short tons per year

[1] *Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.*

Comparison to Current Total County Emissions

	Emissions (tpy)					
Emissions	**CO**	**NO_x**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
2008 NEI Emissions	*46,173*	*8,485*	*9,035*	*132*	*15,327*	*2,319*
Alt. C O&G (%) of NEI Emissions	*0.1%*	*0.2%*	*1.5%*	*0.0%*	*0.1%*	*0.1%*
Alt. C (%) of NEI Emissions	*1.2%*	*0.4%*	*1.8%*	*2.7%*	*1.2%*	*2.5%*

County Emissions (Butte, Custer, Fall River, Haakon, Harding, Lawrence, Meade, Pennington, Perkins, and Stanley counties).

Source: EPA 2008 National Emission Inventory (NEI), http://neibrowser.epa.gov/eis-public-web/geo/county-emissions.html?stateJurisdictionId=43&inventoryYear=2008, accessed December 12, 2011.

Comparison to Other Alternatives

	Emissions (tpy)										
Emissions	**CO**	**NO_x**	**VOC**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**	**HAPs**	**CO_2**	**CH_4**	**N_2O**	**CO_{2ea}**
Alt. C - Alt. A	*203*	*(16)*	*(149)*	*2*	*15*	*20*	*(10)*	*(5,630)*	*(22)*	*2*	*(5,484)*
Alt. C - Alt. B	*(486)*	*(28)*	*(127)*	*(3)*	*(53)*	*(40)*	*(9)*	*(3,843)*	*(64)*	*(3)*	*(6,271)*
Alt C % Increase Over Alt A	*55.0%*	*(30.7%)*	*(48.5%)*	*113.2%*	*8.7%*	*52.2%*	*(40.3%)*	*(51.5%)*	*(5.4%)*	*124.3%*	*(27.6%)*
Alt B % Increase Over Alt B	*(46%)*	*(43%)*	*(44%)*	*(49%)*	*(22%)*	*(41%)*	*(39%)*	*(42%)*	*(14%)*	*(50%)*	*(30%)*

Alternative D
SDFO Future Year Emission Estimate Summary

Ownership	Emissions (tpy)										
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAPs	CO_2	CH_4	N_2O	CO_{2ea}
Federal / BLM											
Oil and Gas Development and Production											
Oil	67	29	230	0	13	3	15	6,446	37	0	7,240
Natural Gas	15	5	8	0	3	1	2	1,873	16	0	2,204
CBNG	2	1	1	0	1	0	0	178	5	0	286
Bentonite Mining	66	0	0	0	71	11	0	157	0	0	157
BLM Travel	1	0	0	0	9	1	0	42	0	0	44
BLM Road Maintenance	0	0	0	0	0	0	0	1	0	0	1
Fire Management [1]	905	25	47	7	130	82	8	75	48	7	3,215
Forestry Management	2	3	0	0	3	1	0	347	0	0	349
Livestock Grazing	0	0	0	0	9	1	0	18	340	0	7,148
Vegetation Management	0	0	0	0	1	0	0	2	0	0	2
Federal Emission Total	**1,058**	**64**	**286**	**7**	**240**	**99**	**24**	**9,138**	**445**	**7**	**20,646**
Non-Federal											
Oil and Gas Development and Production											
Oil	295	247	1,147	2	62	17	73	29,355	183	0	33,228
Natural Gas	50	34	38	0	9	2	10	4,984	67	0	6,378
CBNG	34	22	12	2	7	2	2	2,783	53	0	3,904
Non-Federal Emission Total	**379**	**303**	**1,196**	**4**	**77**	**21**	**84**	**37,122**	**303**	**0**	**43,510**

tpy = short tons per year

[1] *Excludes smoke emissions from wildfires, but includes smoke emissions from prescribed fires.*

Comparison to Current Total County Emissions

Emissions	Emissions (tpy)					
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$
2008 NEI Emissions	*46,173*	*8,485*	*9,035*	*132*	*15,327*	*2,319*
Alt. D O&G (%) of NEI Emissions	*0.2%*	*0.4%*	*2.6%*	*0.1%*	*0.1%*	*0.1%*
Alt. D (%) of NEI Emissions	*2.3%*	*0.8%*	*3.2%*	*5.4%*	*1.6%*	*4.3%*

County Emissions (Butte, Custer, Fall River, Haakon, Harding, Lawrence, Meade, Pennington, Perkins, and Stanley counties).

Source: EPA 2008 National Emission Inventory (NEI), http://neibrowser.epa.gov/eis-public-web/geo/county-emissions.html?stateJurisdictionId=43&inventoryYear=2008, accessed December 12, 2011.

Comparison to Other Alternatives

Emissions	Emissions (tpy)										
	CO	NO_x	VOC	SO_2	PM_{10}	$PM_{2.5}$	HAPs	CO_2	CH_4	N_2O	CO_{2ea}
Alt. D - Alt. A	*689*	*12*	*(22)*	*5*	*68*	*60*	*(0)*	*(1,787)*	*43*	*5*	*787*
Alt. D - Alt. B	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Alt. D - Alt. C	*486*	*28*	*127*	*3*	*53*	*40*	*9*	*3,843*	*64*	*3*	*6,271*
Alt D % Increase Over Alt A	*186.9%*	*22.0%*	*(7.2%)*	*317.5%*	*40.0%*	*156.7*	*(1.8%)*	*(16.4%)*	*10.6%*	*347.3%*	*4.0%*
Alt D % Increase Over Alt B	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Alt D % Increase Over Alt C	*85%*	*76%*	*80%*	*96%*	*29%*	*69%*	*64%*	*73%*	*17%*	*99%*	*44%*